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United States Department of Agriculture

Soil Conservation Service

Montana Agricultural Experiment Station

Bozeman, Montana

MONTANA WATER SUPPLY OUTLOOK

Snowpack and Streamflow Forecasts as of February 1, 1984

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SNOW SURVEY UNIT
Federal Bldg., Rm. 443
10 East Babcock
Bozeman, MT 59715

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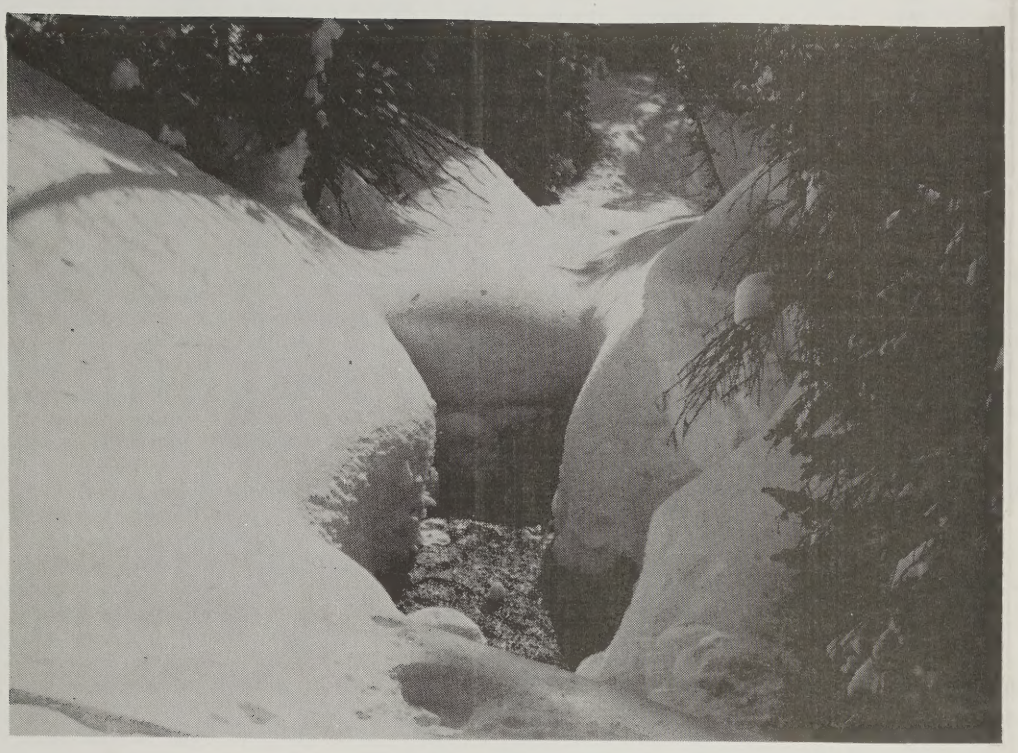

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The Montana Water Supply Outlook is a publication of the U.S. Soil Conservation Service. The SCS administers the Cooperative Snow Survey Program in cooperation with other federal, state and private agencies, organizations, and individuals.

The report is prepared by SCS, Snow Survey and Water Supply Forecast Staff, Room 443, Federal Building, 10 East Babcock, Bozeman, Montana.

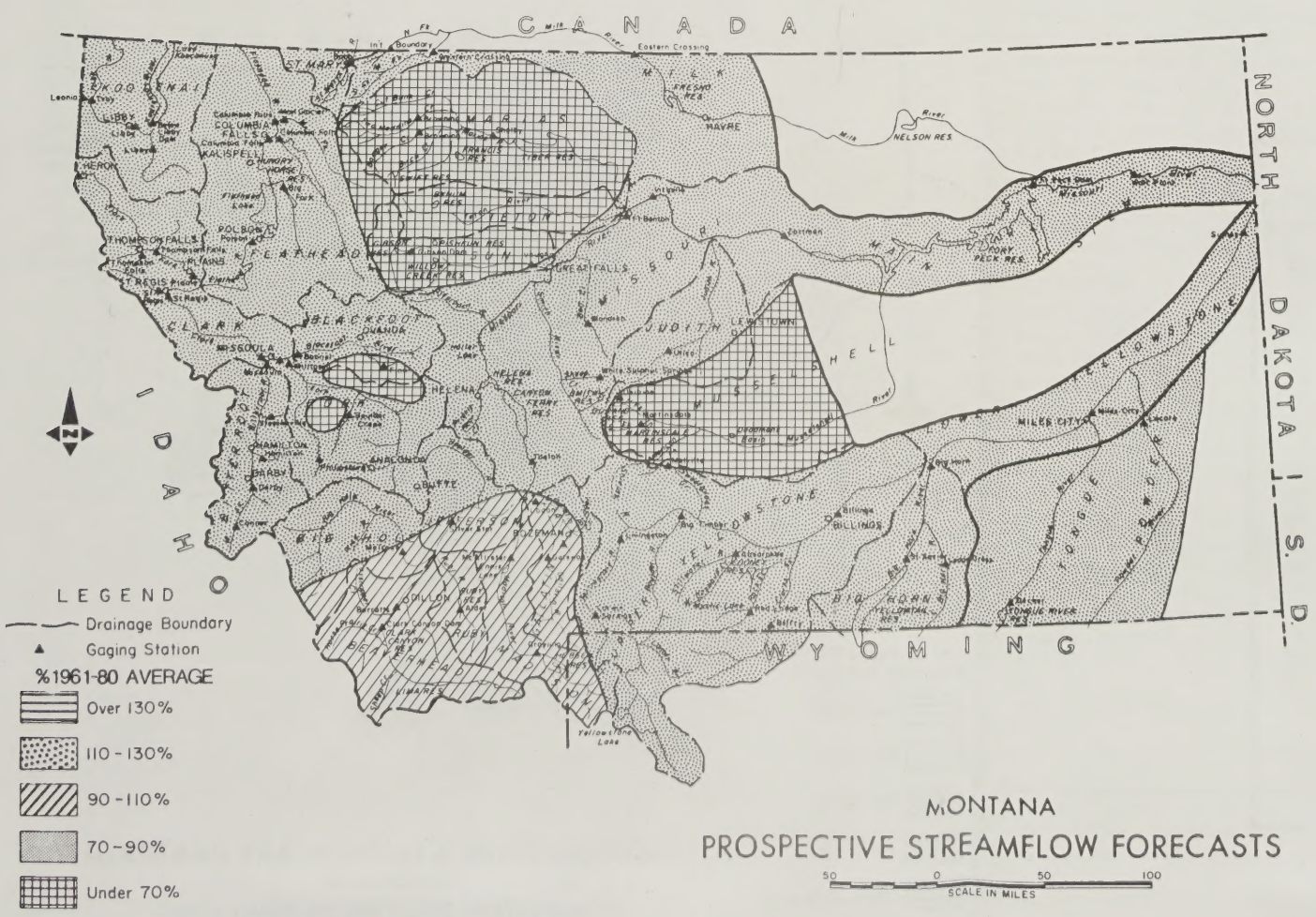
FEDERAL - STATE - PRIVATE
COOPERATIVE SNOW SURVEYS
Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry
"The Conservation of Water begins with the Snow Survey"

Snowpack below average . . . and holding!

Only the southwest parts of Montana can expect near average runoff this spring and summer. All other areas not having stored water can anticipate irrigation and other water supply shortages. These shortages may vary from moderate to extreme depending on weather conditions over the next few months.

Current weather patterns are not favorable for increased moisture and major changes in storm activity are not expected in the near future.

Present forecasts are in the 90 to 100 percent range on most Missouri River headwater streams. In the Sun, Teton, Marias and Musselshell Rivers, forecasts are for around 50 to 60 percent of average runoff. Most of the other drainages can expect streamflows around the 70 to 80 percent of average.



MONTANA
PROSPECTIVE STREAMFLOW FORECASTS
SCALE IN MILES 50 0 50 100

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SCS to drop nonessential snow courses

The Soil Conservation Service needs your help in identifying manual snow courses that can be dropped from the snow survey network or snow courses where monthly measurements can be reduced.

By February 24, please identify the Montana snow courses and measurement dates (January, March, April, etc.) that are essential to your operations. It would also help if you explained how you use the snowpack data (volume forecast relationship, general snowpack information, resource management, etc.).

Please send your replies to Glen Loomis, State Conservationist, Soil Conservation Service, Federal Building, Room 443, 10 East Babcock, Bozeman, Montana 59715.

If you respond, the SCS will keep you advised of its plan for reducing manual snow surveys in Montana. You will be given an opportunity to comment on the plan.

This identification process is the first phase of an evaluation of the snow survey network.

After February 24, the SCS will know which snow courses are not needed or being used by SCS or cooperators. This phase will also show courses that could be discontinued without seriously impacting present programs.

The second phase of the evaluation will identify snow courses that are needed but where all or some of the measurements can be accurately estimated from SNOTEL or where they are highly correlated to a nearby snow course.

Other phases of the plan will address areas where additional automated sites are needed or where manual measurements can be made more economically. The overall goal of this evaluation is to provide adequate snow survey information using the most economical and feasible methods available.

Possible water shortages expected

Most mountainous areas in Montana have below average snowpack. One exception is the extreme southwest corner where carryover from early season storms is enough to hold the snowpack to near average levels. January produced below to well below average snowfall over all of Montana.

Presently, most areas have 60 to 80 percent of average snow cover. Usually, about two-thirds of the season's snowpack is on the ground by this time of year. Unless there is a considerable change in weather patterns, most of the State can expect this year's snow accumulation to be below to well below normal.

Less than one-half of the snow course sites were visited this month. Near the first of March, nearly all of the snow courses will be measured and will provide complete coverage of this season's snow accumulation.

Long-range weather forecasts are not favorable, as they generally predict the continuation of below normal moisture.

Missouri River & Hudson Bay Drainages

STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average
PERIOD	April - September				April - July			
RED ROCK RIVER near Monida (1)	106	103	186	103	100	104	159	96.3
BEAVERHEAD RIVER near Grant (2)	152	96	250	158	134	98	197	137
BEAVERHEAD RIVER at Barratts (2)	198	95		209	173	96		180
RUBY RIVER near Alder	103	102		101	87.5	103		84.6
BIG HOLE RIVER near Melrose	685	90		760	620	89		698
BOULDER RIVER near Boulder	Streamflow measurements			98.7	discontinued			87.8
WILLOW CREEK near Harrison	16.2	81		20.0	14.8	83		17.8
MADISON RIVER near Grayling (3)	470	95	532	496	370	95	408	388
MADISON RIVER near McAllister (4)	840	99	947	848	660	98	749	672
GALLATIN RIVER near Gateway	505	93	534	545	434	94	451	464
INFLOW MIDDLE CREEK RESERVOIR near Bozeman (5)	26.5	93		28.6	22.9	93		24.7
HYALITE CREEK near Bozeman (6)	40.7	91		44.8	35.6	92		38.7
GALLATIN RIVER at Logan	548	90		611	472	90		523
MISSOURI RIVER at Toston (7)	2295	90	2885	2,545	1970	90	2385	2,196
SHEEP CREEK near White Sulphur Springs	17.2	79	16.8	21.8	14.7	77	13.0	19.0
SUN RIVER at Gibson Dam (8)	370	65	349	570	335	64	304	522
BELT CREEK near Monarch	100	75		134	91.0	74		123
MISSOURI RIVER at Fort Benton (9)	3308	83		3,980	2878	83		3,468
TWO MEDICINE CREEK near Browning (10)	174	70		248	165	70		235
BADGER CREEK near Browning	87.0	67		130	73.0	65		113
CUT BANK CREEK at Cut Bank	77.0	68		114	71.0	66		108
MARIAS RIVER near Shelby	330	61	247	542	310	60	232	518
MISSOURI RIVER at Virgelle (11)	3650	80		4,570	3220	80		4,030
MISSOURI RIVER near Landusky (11)	4040	81		4,980	3550	81		4,383
NORTH FORK MUSSELSHELL RIVER near Delpine	4.2	66		6.4	3.5	65		5.4
SOUTH FORK MUSSELSHELL RIVER above Martinsdale	38.3	61		62.8	35.0	59		58.9
MISSOURI RIVER below Fort Peck Dam (11)	3930	79		4,961	3500	79		4,428
MILK RIVER at Eastern Crossing*	251	91		275				
MILK RIVER at Eastern Crossing (12)*	94.7	87		109				
INFLOW LAKE SAKAKAWEA, ND (11)	10459	82		12,755	9520	82		11,608
SASKATCHEWAN RIVER BASIN								
SWIFTCURRENT CREEK at Sherburne (13)	103	80	100	128	90.0	80	87.9	112
ST. MARY'S RIVER near Babb (13)	390	80		487	330	79		416

*March-September forecast

(1) Adjusted for storage in Lima Reservoir.
(2) Adjusted for storage in Lima and Clark Canyon Reservoirs.
(3) Adjusted for storage in Hebgen Lake.
(4) Adjusted for storage in Hebgen Lake and Ennis Lake.
(5) Sum of West Fork Hyalite Creek and East Fork Hyalite Creek above the Reservoir.
(6) Adjusted for storage in Middle Creek Reservoir.
(7) Adjusted for storage in Lima, Hebgen, Ennis & Clark Canyon Reservoirs.
(8) Adjusted for storage in Gibson Reservoir & diversions.
(9) Adjusted for storage in Lima, Clark Canyon, Hebgen, Ennis, Gibson, Pishkun, Willow Creek & Canyon Ferry Reservoirs.
(10) Adjusted for storage in Two Medicine Reservoir & diversions in Two Medicine Canal.
(11) Adjusted for all upstream reservoirs.
(12) Flow at Eastern Crossing minus St. Mary's Canal.
(13) Adjusted for storage in Lake Sherburne.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

January snowfall below average

January snowfall was below average in all mountain areas. The extreme southwest corner still shows the best snowpack in the State. In this area, the snow is presently near average as a result of early season snowfall.

All other areas show below average accumulation of water with some areas having only 50 percent of average.

Soils under the snowpack are generally drier than normal in all areas except for Missouri River headwater streams in the southwest part of the State. Soil moisture levels in these areas vary from near average to a little wetter than usual.

WATER SUPPLY OUTLOOK

Expressed as "Poor, Fair, Average, Excellent" With Respect to Usual Supply.

STREAM or AREA	Flow Period: Spring Season	Flow Period: Late Season
Beaverhead	Avg	Avg
Ruby	Avg	Avg
Big Hole	Avg	Fair
Boulder	Fair	Fair
Jefferson	Fair	Fair
Madison	Avg	Avg
Gallatin	Avg	Fair
West-Side Missouri	Fair	Poor
Smith-Belt	Fair	Poor
Sun	Poor	Poor
Teton	Poor	Poor
Marias	Poor	Poor
Judith	Poor	Poor
Musselshell	Poor	Poor
Milk	Avg	Avg
Bear Paws	Fair	Fair
St. Mary's	Fair	Fair

SUMMARY of SNOW MEASUREMENTS

(COMPARISON WITH PREVIOUS YEARS)

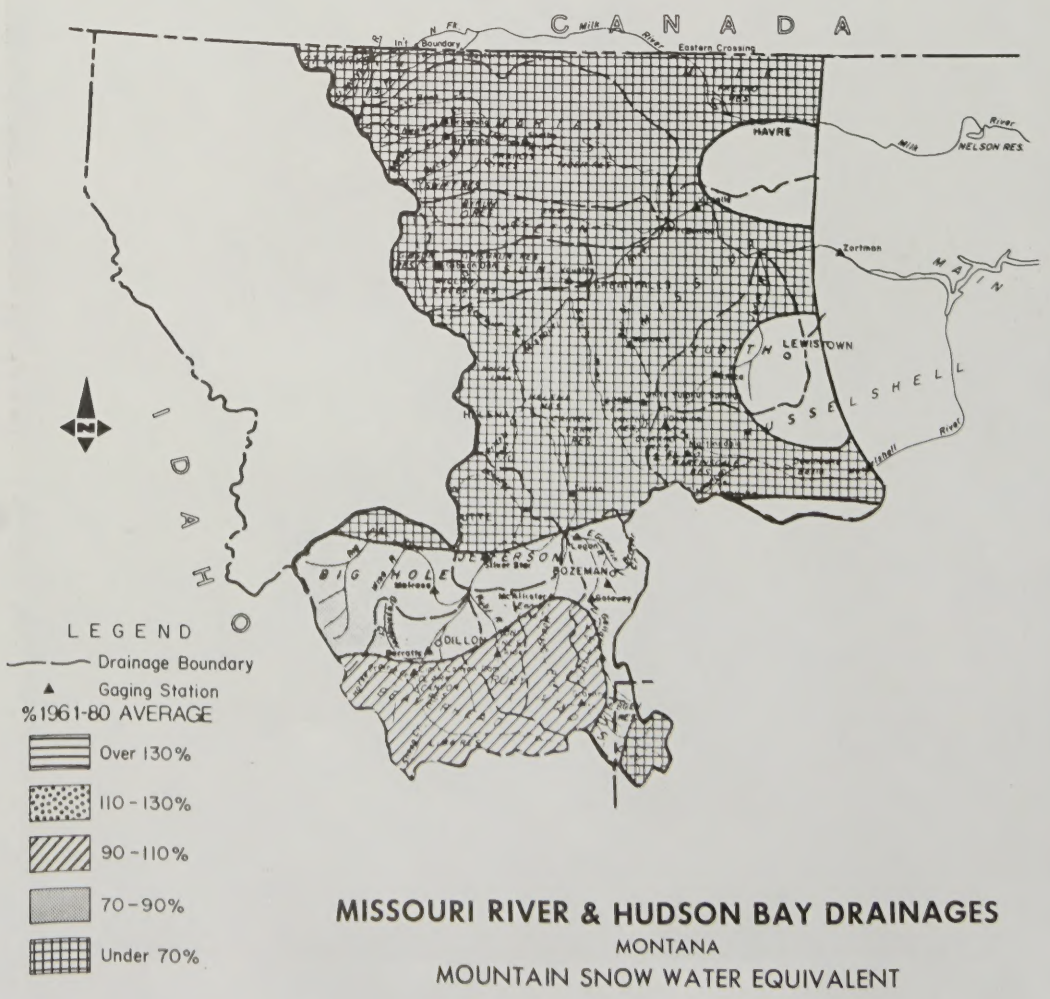
RIVER BASIN and/or SUB-WATERSHED	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF: Last Year	Average
Beaverhead	16	84	89
Ruby	5	103	103
Big Hole	16	77	76
Boulder	13	68	63
Jefferson	50	81	81
Madison	19	93	82
Gallatin	17	109	86
Missouri Headwater	86	90	82
West-side Missouri (Toston-Cacade)	8	68	61
Smith-Belt-Arrow	5	105	76
Missouri Main-stem	13	84	68
Teton & Sun	3	67	47
Marias	5	96	61
Marias-Teton-Sun	8	88	58
Judith-Musselshell	7	101	71
Milk	11	105	65
Bear Paws	7	201	93
Missouri (Total)	114	90	78
Saskatchewan			
St. Mary's	5	71	56
Bow River in Alberta	--	--	--

Missouri headwaters near average

Near average runoff is forecast for the Beaverhead, Ruby, Madison and Upper Gallatin Rivers. All other drainages can expect below average flows. Well below average streamflow is predicted for streams in the Sun, Teton and Marias River drainages and smaller streams originating in the mountains of central Montana.

Unless weather patterns improve, shortages of irrigation water supplies could be severe on streams not having reservoir storages. The areas that have a low water supply this year are the same drainages that produced below average runoff last season.

If conditions do not improve by next month, water users in Montana need to begin developing alternatives to counteract reduced water supplies.



MISSOURI RIVER & HUDSON BAY DRAINAGES
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT

SNOW SURVEY DATA

SNOW February 1, 1984

DRAINAGE BASIN and/or SNOW COURSE NAME	Elevation	THIS YEAR Date of Survey	Snow Depth (Inches)	Water Content (Inches)	PAST RECORD Water Content (inches) Last Year	Average
ARCH FALLS	7350	1/26	31	7.2	5.5	8.6
ASHLEY DIVIDE	4820	1/27	14	3.4	4.6	5.6
ASHLEY LAKE	4000	1/27	14	2.2	3.9	5.0
BADGER PASS	6900	2/04	58	18.0A	19.0	28.0
BADGER PASS PILLOW	6900	2/01	SP	14.0	17.0	21.1
BANFIELD MOUNTAIN	5600	1/26	29	6.8	16.7	17.3
BANFIELD MOUNTAIN PILLOW	5600	1/26	SP	7.2	15.2	15.0
BARKER LAKES PILLOW	8250	2/01	SP	7.0	13.0	10.7
BASIN CREEK	7180	1/30	18	2.9	7.0	3.8
BASIN CREEK PILLOW	7180	2/01	SP	2.4	5.4	5.4
BEAGLE SPRINGS PILLOW	8850	2/01	SP	5.5	4.7	5.0
BEAR PAW SKI AREA	5200	1/30	19	5.0	3.5	5.3
BIG SKY	7700	1/30	36	9.4	9.6	10.2
BLACK BEAR PILLOW	7950	2/01	SP	22.2	25.1	24.1
BLACK PINE	7100	1/26	25	5.1	6.4	9.7
BLACK PINE PILLOW	7100	2/01	SP	5.9	6.6	10.0
BLOODY DICK PILLOW	7550	2/01	SP	4.7	6.6	8.3
BLUE LAKE	5900	2/04	38	11.0A	14.0	17.9
BOULDER MOUNTAIN PILLOW	7950	2/01	SP	13.1	12.7	14.5
BOX CANYON PILLOW	6700	2/01	SP	4.9	4.9	6.6
BOXELDER CREEK	5100	1/30	23	6.8		6.2
BRIDGER BOWL	7250	1/30	48	16.0	12.3	19.0
BRIDGER BOWL PILLOW	7250	1/30	SP	13.7	10.8	17.2
BULL MOUNTAIN	6600	2/01	13	2.9	4.0	4.1
CALVERT CREEK PILLOW	6430	2/01	SP	4.1	4.9	6.7
CARROT BASIN	9000	1/31	65	22.6	23.1	25.3
CARROT BASIN PILLOW	9000	1/31	SP	18.3	19.3	21.5
CARTER CREEK	7400	2/01	16	4.2	4.3	3.4
CASHE CREEK	7800	2/01	29	7.2		-
CASHE CREEK PILLOW	7800	2/01	SP	5.8	6.8	-
CEDAR GROVE	3760	1/26	22	5.3	8.4	9.3
CHESSMAN RESERVOIR	6200	1/26	5	1.0	4.2	2.9
CHICKEN CREEK	4060	1/26	32	8.5	9.6	11.4
CLOVER MEADOW PILLOW	8800	2/01	SP	12.8	8.3	11.6
COLE CREEK	7850	1/26	37	9.6	10.7	12.2
COLE CREEK PILLOW	7850	2/01	SP	9.5	11.1	10.3
COMBINATION	5600	1/26	12	2.7	2.8	4.4
COMBINATION PILLOW	5600	2/01	SP	2.7	3.8	3.9
COPPER BOTTOM PILLOW	5200	2/01	SP	6.3	7.1	9.9
COPPER CAMP PILLOW	6950	2/01	SP	12.2	17.6	25.6
COPPER MOUNTAIN	7700	1/30	24	5.8	6.3	7.8
COYOTE HILL	4200	1/30	23	6.1	6.0	8.1
CRYSTAL LAKE PILLOW	6050	2/01	SP	6.8	6.5	8.2
DAISY PEAK	7600	1/31	22	4.6	6.0	8.0
DALY CREEK PILLOW	5780	2/01	SP	4.5	7.4	8.5
DARKHORSE LAKE PILLOW	8700	2/01	SP	15.7	11.5	15.2
DEADMAN CREEK PILLOW	6450	2/01	SP	5.4	5.2	8.1
DESERT MOUNTAIN	5600	1/26	26	6.3	10.1	11.0
DEVILS SLIDE	8100	1/26	50	14.8	11.8	15.2
DISCOVERY BASIN	7050	1/26	24	5.1	6.4	7.2
DIVIDE PILLOW	7800	2/01	SP	7.1	8.4	6.8

SNOW February 1, 1984

DRAINAGE BASIN and/or SNOW COURSE NAME	Elevation	THIS YEAR Date of Survey	Snow Depth (Inches)	Water Content (Inches)	PAST RECORD Water Content (inches) Last Year	Average
DIX HILL	6400	1/29	20	5.6	6.3	8.5
DUPUYER CREEK PILLOW	5750	2/01	SP	3.6	-	-
EMERY CREEK	4350	1/26	30	8.0	12.3	10.7
EMERY CREEK PILLOW	4350	2/01	SP	7.6	12.1	10.6
FISH CREEK	8000	1/30	21	4.2	8.0	6.4
FISHER CREEK PILLOW	9100	2/01	SP	19.2	20.3	25.6
FLATTOP MOUNTAIN PILLOW	6300	2/01	SP	20.7	32.7	33.0
FLEECER RIDGE	7500	2/01	22	4.6	6.0	7.8
FOURTH OF JULY	3450	1/27	14	3.3	7.4	6.9
FRIDAY HILL	4620	1/27	31	7.4	18.5	17.8
FROHNER MEADOWS	6480	1/26	12	3.6	6.0	5.9
FROHNER MEADOWS PILLOW	6480	2/01	SP	4.2	5.7	5.3
GARVER CREEK	4250	1/26	19	4.8	8.9	8.9
GARVER CREEK PILLOW	4250	1/26	SP	3.8	8.2	7.5
GIBBONS PASS	7100	1/30	48	13.4	17.9	16.2
GRAVE CREEK	4300	1/26	28	6.8	14.4	12.2
GRAVE CREEK PILLOW	4300	2/01	SP	7.3	15.4	12.2
HAND CREEK	5030	1/30	20	5.0		9.0
HAND CREEK PILLOW	5030	2/01	SP	4.4	10.6	10.7
HAWKINS LAKE	6450	2/01	EST	12.1	24.6	22.6
HAWKINS LAKE PILLOW	6450	2/01	SP	10.6	21.8	21.2
HEART LAKE TRAIL	4800	1/31	33	10.6	12.5	15.7
HEBGEN DAM	6550	1/31	34	8.6	9.5	8.8
HELL ROARING DIVIDE	5770	1/31	50	15.7	20.1	22.4
HERRIG JUNCTION	4850	1/26	42	11.2	19.1	17.7
HOLBROOK	4530	2/04	13	3.5A	6.0	7.5
HOOD MEADOW	6600	1/26	24	6.6	5.2	7.8
HOODOO BASIN	6050	1/31	78	26.2	33.7	34.8
HOODOO BASIN PILLOW	6050	2/01	SP	21.5	27.6	28.3
HOODOO CREEK	5900	1/31	74	24.6	31.2	32.4
INTERGAARD	6450	1/31	11	2.8	4.1	5.9
JOHNSON PARK	6450	1/31	13	2.8	3.4	5.5
KINGS HILL	7500	1/31	30	7.6	6.6	9.9
KIWANIS CAMP	3720	1/30	2	.2	.6	1.9
KRAFT CREEK PILLOW	4750	2/01	SP	7.3	9.3	-
LAKEVIEW CANYON	6930	1/27	24	6.2	11.8	8.5
LAKEVIEW RIDGE	7400	1/27	24	5.5	10.4	7.6
LAKEVIEW RIDGE PILLOW	7400	2/01	SP	7.4	11.4	8.2
LEMHI RIDGE PILLOW	8100	2/01	SP	4.5	4.8	6.9
LICK CREEK	6860	1/26	25	5.8	5.0	7.0
LICK CREEK PILLOW	6860	2/01	SP	4.9	4.2	5.7
LITTLE PARK	7400	2/01	37	10.7		-
LONE MOUNTAIN	8880	1/30	50	15.2	14.8	15.7
LOWER TWIN PILLOW	7900	2/01	SP	12.3	14.8	13.7
LUBRECHT FLUME	4680	2/02	7	2.0	3.9	5.0
LUBRECHT FLUME PILLOW	4680	2/01	SP	2.7		4.6
LUBRECHT FOREST # 3	5450	2/02	11	3.0	3.8	5.7
LUBRECHT FOREST # 4	4650	2/02	4	1.1	2.1	3.1
LUBRECHT FOREST # 6	4040	2/02	3	.9	2.4	1.9
LUBRECHT HYDROPLOT	4200	2/02	11	3.0	4.0	5.6
MANY GLACIER	4900	1/28	22	7.5	15.1	14.5
MANY GLACIER PILLOW	4900	2/01	SP	7.0	13.0	13.5
MARIAS PASS	5250	1/30	22	5.9	12.0	11.8
MAYNARD CREEK	6210	1/30	28	8.3	7.7	11.4
MAYNARD CREEK PILLOW	6210	1/30	SP	5.3	6.0	9.0
MONUMENT PEAK PILLOW	8850	2/01	SP	10.9	11.0	15.1
MOULTON RESERVOIR	6850	1/31	18	3.7	4.0	5.2
MOUNT LOCKHART PILLOW	6400	2/01	SP	8.6	10.9	15.2
MULE CREEK PILLOW	8350	2/01	SP	8.5	7.8	9.5
NEVADA CREEK PILLOW	6480	2/01	SP	4.7	7.0	9.2
NEW WORLD	6900	1/30	31	9.2	7.5	10.5
NEWTON MOUNTAIN	5600	1/27	51	15.2	28.0	24.7

SNOW February 1, 1984

DRAINAGE BASIN and/or SNOW COURSE NAME	Elevation	THIS YEAR Date of Survey	Snow Depth (Inches)	Water Content (Inches)	PAST RECORD Water Content (inches) Last Year	Average
NEZ PERCE CAMP PILLOW	5650	2/01	SP	8.6	8.8	10.1
NEZ PERCE CREEK	6500	1/30	16	3.6	3.9	5.2
NOISY BASIN	6040	1/27	78	28.3	29.6	28.7
NOISY BASIN PILLOW	6040	2/01	SP	25.1	26.9	24.2
NORTH FK. ELK CREEK	6250	2/02	21	4.8	7.2	9.0
NORTH FK. ELK CREEK PILLOW	6250	2/01	SP	5.2	6.6	7.9
NORTH FORK JOCKO	6330	1/30	67	24.4	28.1	29.1
NORTHEAST ENTRANCE	7350	1/31	21	4.4	6.4	7.2
NORTHEAST ENTRANCE PILLOW	7350	2/01	SP	4.6	5.8	6.8
OPHIR PARK	7150	1/29	32	9.2	10.6	12.0
PETERSON MEADOWS	7200	1/31	18	4.6	5.7	7.0
PETERSON MEADOWS PILLOW	7200	1/31	SP	4.7	6.0	6.7
PICKFOOT CREEK PILLOW	6650	2/01	SP	5.3	6.4	8.3
PIKE CREEK PILLOW	5930	2/01	SP	10.9		18.5
PIPESTONE PASS	7200	1/30	8	1.8	3.2	3.8
PLACER BASIN PILLOW	8830	2/01	SP	9.9	8.4	11.2
POORMAN CREEK	5100	1/26	51	15.3	22.0	23.9
POORMAN CREEK PILLOW	5100	1/26	SP	12.8	22.1	22.0
PORCUPINE PILLOW	6500	2/01	SP	4.1	4.7	4.8
RED TOP	5260	1/27	41	11.4	24.4	20.2
ROCKER PEAK PILLOW	8000	2/01	SP	5.4	8.2	10.5
ROCKY BOY	4700	1/30	12	2.8	3.0	3.6
ROCKY BOY PILLOW	4700	2/01	SP	3.8	3.3	3.4
SADDLE MOUNTAIN	7940	1/30	52	14.4	18.0	17.9
SADDLE MOUNTAIN PILLOW	7900	2/01	SP	14.5	16.9	17.7
SHOWER FALLS	8100	1/26	52	15.2	12.9	16.3
SHOWER FALLS PILLOW	8100	2/01	SP	15.1	12.9	15.3
SILVER RUN	6630	1/26	13	2.7	2.9	3.9
SILVER RUN PILLOW	6630	2/01	SP	3.6	3.2	3.0
SKALKAHO SUMMIT PILLOW	7250	2/01	SP	10.3	14.0	18.5
SKYLARK TRAIL PILLOW	6200	2/01	SP	17.2	17.7	-
SPOTTED BEAR MOUNTAIN	7000	1/30	28	7.2	8.6	11.2
SPUR PARK PILLOW	8100	2/01	SP	11.9	10.2	15.7
STAHL PEAK	6030	1/26	64	19.4	26.6	27.1
STAHL PEAK PILLOW	6030	2/01	SP	17.6	24.5	22.7
STORM LAKE	7780	1/31	27	7.0	9.8	9.4
STRYKER BASIN	6180	1/26	54	15.1	22.4	23.4
STUART MILL	6500	1/31	8	2.0	3.9	4.7
STUART MOUNTAIN	7400	1/30	57	19.5	19.2	22.4
SUCKER CREEK	3960	1/30	0	.0	.2	0.7
TAYLOR ROAD	4080	1/30	11	4.0	.6	3.0
TEN MILE LOWER	6600	1/25	16	3.8	5.8	5.5
TEN MILE MIDDLE	6800	1/25	24	5.6	6.9	8.1
TEN MILE UPPER	8000	1/25	28	6.9	7.6	9.9
TEPEE CREEK PILLOW	8000	2/01	SP	9.0	8.0	8.4
TRINKUS LAKE	6100	1/30	67	25.1	24.2	27.5
TRUMAN CREEK	4060	1/27	10	2.6	2.6	3.0
TV MOUNTAIN	6800	1/30	37	10.8	11.3	13.4
TWELVEMILE CREEK PILLOW	5600	2/01	SP	8.9	10.1	14.0
TWENTY-ONE MILE	7150	1/28	36	9.2	11.0	13.0
TWIN CREEKS	3580	2/04	18	5.0A	7.5	9.0
TWIN LAKES PILLOW	6400	2/01	SP	20.8	28.0	29.0
UPPER HOLLAND LAKE	6200	1/30	58	19.6	21.2	24.4
WALDRON PILLOW	5600	2/01	SP	3.8	5.9	7.9
WARM SPRINGS PILLOW	7800	2/01	SP	10.8	11.7	15.6

SNOW February 1, 1984

DRAINAGE BASIN and/or SNOW COURSE NAME	Elevation	THIS YEAR Date of Survey	Snow Depth (Inches)	Water Content (Inches)	PAST RECORD Water Content (inches) Last Year	Average
WEASEL DIVIDE	5450	1/26	49	13.4	25.8	23.5
WEST YELLOWSTONE	6700	1/28	28	7.2	8.2	8.6
WEST YELLOWSTONE PILLOW	6700	1/28	SP	5.4	6.9	7.0
WHISKEY CREEK PILLOW	6800	2/01	SP	8.5	11.6	11.2
WHITE MILL PILLOW	8700	2/01	SP	12.8	16.5	16.6
WILLOW CREEK	6500	1/26	25	5.5	4.6	5.9
WOOD CREEK PILLOW	5960	2/01	SP	2.5	5.3	8.0
IDAHO						
ABOVE BURKE (ID)	4100	1/30	30	9.0	12.5	14.8
BEAR MOUNTAIN PILLOW (ID)	5400	2/01	SP	23.2	49.2	-
BIG SPRINGS (ID)	6500	2/01	38	11.1	14.9	14.5
CAMP CREEK (ID)	6580	1/30	24	4.8		7.5
CRAB CREEK PILLOW (ID)	6860	1/31	SP	10.7	15.4	-
HUMBOLDT GULCH (ID)	4250	1/30	22	6.6	10.0	-
HUMBOLDT GULCH PILLOW (ID)	4250	2/01	SP	4.5	9.9	-
ISLAND PARK (ID)	6290	2/01	35	9.7	13.9	11.7
ISLAND PARK PILLOW (ID)	6290	2/01	SP	8.8	12.5	-
KILGORE (ID)	6320	1/30	30	8.5	10.9	8.2
LOLO PASS (ID)	5230	1/31	47	14.1	15.3	21.5
LOLO PASS PILLOW (ID)	5230	2/01	SP	15.1	-	-
LOOKOUT (ID)	5250	1/30	46	15.0	22.0	24.6
MOOSE CREEK (ID)	6200	1/27	47	11.2	13.0	12.2
MOOSE CREEK PILLOW (ID)	6200	2/01	SP	11.5	12.5	-
MOSQUITO RIDGE (ID)	5200	2/01	56	18.2	30.4	25.8
MOSQUITO RIDGE PILLOW (ID)	5200	2/01	SP	17.0	31.4	-
SAVAGE PASS (ID)	6170	1/31	47	13.8	14.9	18.9
SAVAGE PASS PILLOW (ID)	6170	2/01	SP	13.9	-	-
SAWTELL MOUNTAIN (ID)	8720	2/01	62	22.0	30.1	23.0
SUNSET (ID)	5540	1/31	42	13.2A	21.8	-
TARGHEE PASS (ID)	6980	2/01	29	7.8	10.1	10.5
VALLEY VIEW (ID)	6680	2/01	32	8.6	13.9	11.7
WHITE ELEPHANT (ID)	7710	2/01	45	14.4	18.8	16.0
WHITE ELEPHANT PILLOW (ID)	7710	2/01	SP	15.5		-
WYOMING						
BALD MOUNTAIN (WY)	9380	1/30	51	13.7	14.9	15.0
BALD MOUNTAIN PILLOW (WY)	9380	2/01	SP	12.9	13.5	-
BEARTOOTH LAKE PILLOW (WY)	9270	2/01	SP	10.8	13.4	-
BURGESS R.S. (WY)	7880	1/25	20	4.3	4.7	5.3
BURGESS R.S. PILLOW (WY)	7880	2/01	SP	6.2	7.5	-
CANYON (WY)	7940	2/01	EST	6.6		11.2
CANYON PILLOW (WY)	7940	2/01	SP	6.6	7.9	-
EAST ENTRANCE (WY)	6960	1/30	22	5.2	6.9	7.7
LAKE CAMP (WY)	7780	1/28	24	3.6	5.1	6.4
LUPINE CREEK (WY)	7380	2/02	21	4.8	5.5	7.6
NORRIS BASIN (WY)	7500	1/29	25	5.2	6.1	8.1
OLD FAITHFUL (WY)	7400	1/31	26	4.9	10.0	10.8
SYLVAN LAKE PILLOW (WY)	8420	2/01	SP	13.6		-
SYLVAN PASS (WY)	7100	1/30	26	6.2	8.6	9.7
THUMB DIVIDE (WY)	7980	1/30	35	9.8	12.2	14.6
TROUT CREEK PILLOW (WY)	8400	2/01	SP	3.5	3.6	-
WOLVERINE (WY)	7650	1/29	26	5.7	8.4	9.7
WOLVERINE PILLOW (WY)	7650	2/01	SP	5.6	7.6	-

SP - Snow Pillow observations; water content only.
A - Aerial observation; water content estimated.
EST - Estimated water content.

Columbia River Drainage

STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average
PERIOD	April - September				April - July				April - June			
KOOTENAI RIVER below Libby Dam (1)	6,080	86		7,041	5,200	86		6,020				
FISHER RIVER near Libby	190	72	6,356	264	175	71	5,346	248				
YAAK RIVER near Troy	370	71		523	349	70		500				
KOOTENAI RIVER at Leonia (1)	7,180	83	7,948	8,602	6,260	83	6,857	7,498	5020	83	5,157	6,051
INFLOW MOULTON RESERVOIR nr BUTTE (Million Gallons)					195	74	182	263	174	73	179	237
WARM SPRINGS CREEK AT MEYERS DAM near Anaconda (2)	37.1	79		46.8	30.0	79		37.8				
FLINT CREEK near Southern Cross (3)	14.3	78	18.9	18.3	12.0	78	15.2	15.4				
FLINT CREEK below Boulder Creek (4)	58.0	77		75.8	45.5	76		59.5				
INFLOW LOWER WILLOW CREEK RESERVOIR near Hall (5)	9.9	63		15.7	9.2	62	10.2	14.9				
MIDDLE FORK ROCK CREEK near Philipsburg	59.5	76		78.2	53.5	76		70.5				
NEVADA CREEK near Finn	13.9	60		23.0	12.5	59		21.3				
BLACKFOOT RIVER near Bonner	780	78		999	690	76		904	595	76		782
CLARK FORK RIVER above Milltown (6)	650	80		816	565	80		708	480	80		597
CLARK FORK RIVER above Missoula	1,430	79	1,362	1,815	1,255	78	1,133	1,612	1,075	78	880	1,379
WEST FORK BITTERROOT RIVER near Conner (7)	140	79		178	130	79		164				
BITTERROOT RIVER near Darby	430	74		580	395	74		532	347	75		464
SKALKAHO CREEK near Hamilton	46.0	82		56.0	40.0	82		48.7				
BURNT FORK CREEK near Stevensville (8)	30.3	81		37.4	26.0	81		32.2				
BITTERROOT RIVER at Missoula (9)	1,100	73		1,504	1,005	73		1,384	880	74		1,191
CLARK FORK RIVER below Missoula	2,530	76		3,319	2,260	75		2,996	1,955	76		2,570
CLARK FORK RIVER at St. Regis	3,470	79	3,450	4,411	3,130	79	3,073	3,928	2,710	79	2,437	3,428
NORTH FORK FLATHEAD RIVER near Columbia Falls	1,500	78		1,913	1,355	78		1,732	1,150	78		1,471
MIDDLE FORK FLATHEAD RIVER near West Glacier	1,490	80	1,545	1,869	1,370	80	1,401	1,713	1,175	81	1,122	1,453
SOUTH FORK FLATHEAD RIVER near Columbia Falls (10)	1,830	80	1,847	2,278	1,710	80	1,715	2,142	1,510	81	1,416	1,886
FLATHEAD RIVER at Columbia Falls (10)	4,950	80	4,943	6,208	4,560	80	4,508	5,721	4,000	81	3,654	4,921
SWAN RIVER near Big Fork	545	79		689	480	79		604				
FLATHEAD RIVER near Polson (11)	5,730	79	6,130	7,278	5,310	79	5,538	6,712	4,620	80	4,420	5,759
CLARK FORK RIVER near Plains (11)	9,200	76	9,880	12,153	8,380	76	8,748	11,071	7,190	76	6,902	9,459
THOMPSON RIVER near Thompson Falls	200	77		261	179	77		233				
PROSPECT CREEK at Thompson Falls	115	81		142	107	81		132				
CLARK FORK RIVER at Whitehorse Rapids (12)	10,200	75		13,575	9,280	75		12,351	7,930	75		10,570

(1) Adjusted for storage in Lake Koocanusa.
(2) Adjusted for storage in Silver Lake, diversions to and pumping from Georgetown Lake.
(3) Adjusted for storage in Georgetown Lake, diversions from and pumping to Silver Lake.
(4) Sum Flint Creek at Maxville and Boulder Creek at Maxville.
(5) Sum of North Fork Lower Willow Creek near Hall and South Fork Lower Willow Creek near Hall.
(6) Difference in observed flow Clark Fork above Missoula and Blackfoot near Bonner.
(7) Adjusted for storage in Painted Rocks Reservoir.
(8) Adjusted for diversion into Sunset Highline Canal.
(9) Difference in observed flow Clark Fork above and below Missoula.
(10) Adjusted for storage in Hungry Horse Reservoir.
(11) Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.
(12) Adjusted for storage in Hungry Horse Reservoir, Flathead Lake and Noxon Rapids Reservoir.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

WATER SUPPLY OUTLOOK

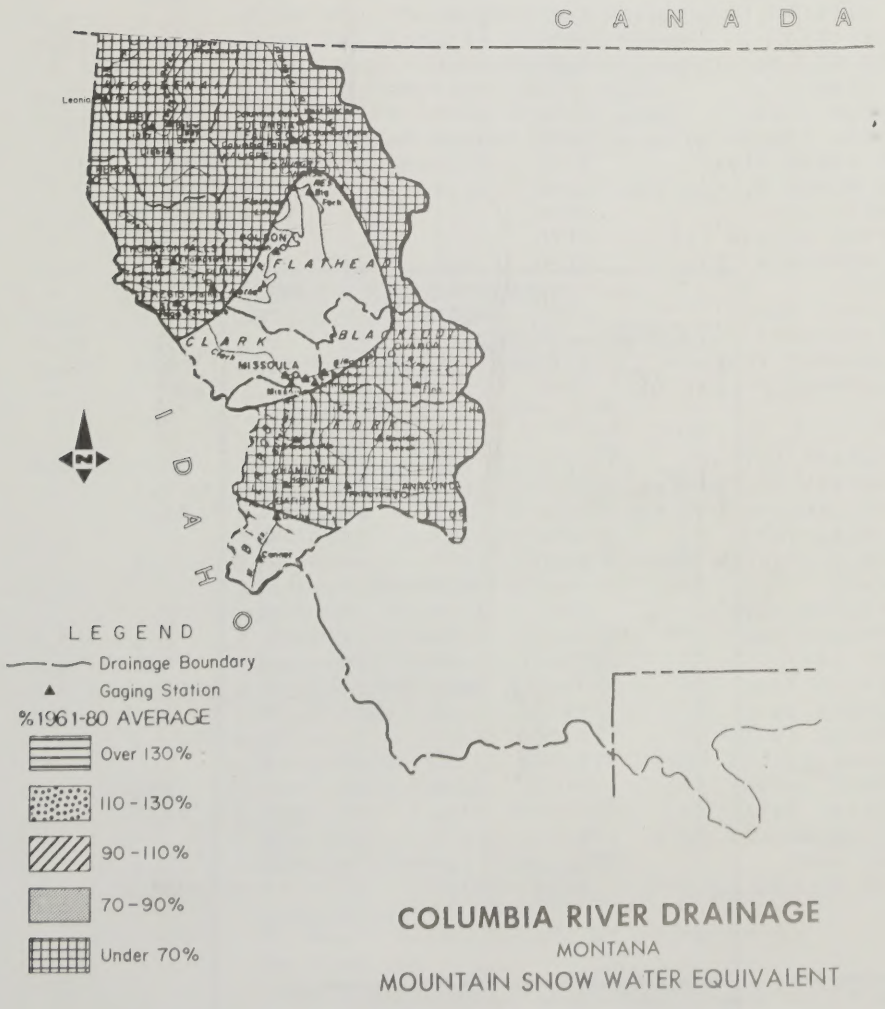
Expressed as "Poor, Fair, Average, Excellent" With Respect to Usual Supply.

STREAM or AREA	Flow Period: Spring Season	Flow Period: Late Season
Tobacco	Fair	Poor
Little Bitterroot	Fair	Poor
Mission Valley	Fair	Fair
Flint Creek	Fair	Fair
Upper Clark Fork	Fair	Fair
Nevada Creek	Fair	Poor
Blackfoot	Fair	Poor
West-side Bitterroot	Fair	Fair
East-side Bitterroot	Fair	Fair
Bitterroot River	Fair	Fair
Lower Clark Fork	Fair	Fair

Snowfall below average

Mountain snowfall was below average last month. The snowpack has deteriorated and now is generally in the 60-70 percent range. The accumulated water content in the Swan and Mission Mountains and along a portion of the Montana-Idaho border is a little better than in other areas but is still below average.

Soils under the snowpack in higher elevations are generally drier than normal but lower elevations are wet from recent rains and snowmelt.



COLUMBIA RIVER DRAINAGE
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT

SUMMARY of SNOW MEASUREMENTS

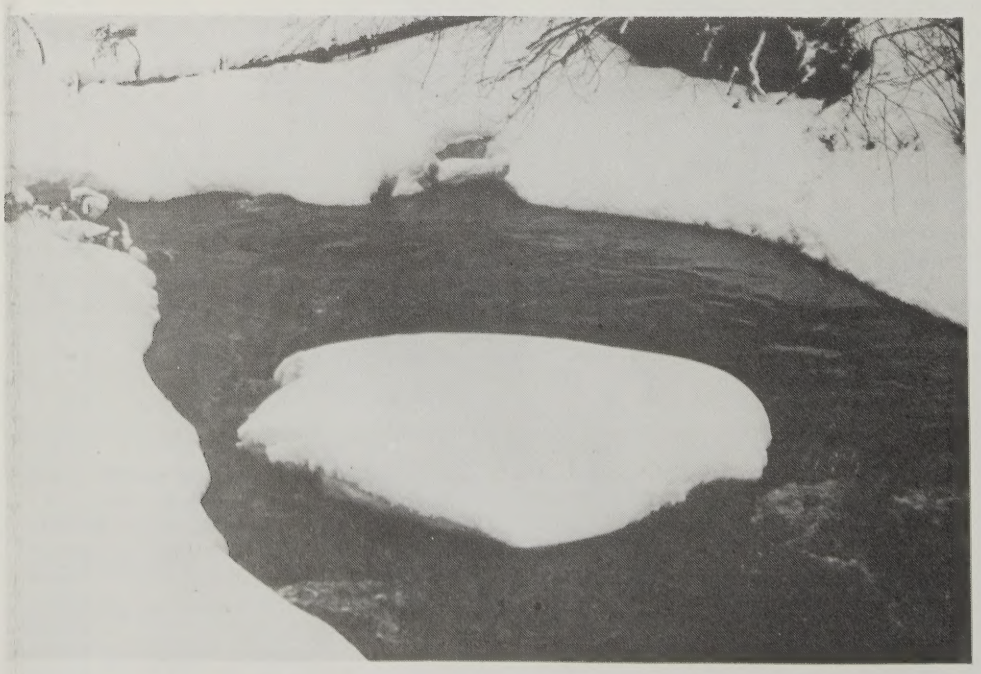
(COMPARISON WITH PREVIOUS YEARS)

RIVER BASIN and/or SUB-WATERSHED	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF Last Year	THIS YEAR'S SNOW WATER AS PERCENT OF Average
East Kootenay/BC.	21	127	70
Kootenai/Montana	20	55	56
Kootenai above Bonners Ferry	41	77	62
Little Bitterroot	5	81	52
N. Fk. Flathead	12	61	64
M. Fk. Flathead	9	79	62
S. Fk. Flathead	11	85	82
Swan	6	94	90
Flathead	43	78	73
Stillwater & Whitefish	6	73	63
Clark Fork above Blackfoot	33	72	62
Blackfoot	17	84	67
Upper Clark Fork above Missoula	50	77	64
Bitterroot	11	81	72
Lower Clark Fork below Missoula	13	75	70
Clark Fork (Total w/o Flathead)	74	77	68
Pend O'Reille (Clark Fork & Flathead)	117	77	70
Columbia (Pend O'Reille & Kootenai)	158	78	68

Streamflow forecasts below average

Below average runoff is expected for all drainages. Spring and summer streamflow is forecast at 20 to 30 percent below average based on current snowpack levels and projections.

The snowfall over the next 2 to 3 months is very critical in determining how severe irrigation water shortages may be this summer. If conditions do not improve over the next month, those not having stored water need to begin considering alternatives and operations with a limited water supply.



Streams are beginning to open because of recent warm weather.

Yellowstone River Drainage

STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average	THIS YEAR FORECAST Thousand Acre Feet	THIS YEAR FORECAST Percent of Average	PAST RECORD THOUSAND ACRE FEET Last Year	PAST RECORD THOUSAND ACRE FEET Average
PERIOD	April - September				April - July			
YELLOWSTONE RIVER at Corwin Springs	1800	89	1725	2,027	1500	89	1397	1,686
YELLOWSTONE RIVER near Livingston	2130	90		2,379	1752	89		1,969
BOULDER RIVER at Big Timber	318	80		398	300	82		366
STILLWATER near Absarokee (1)	530	84		632	442	84		528
CLARKS FORK RIVER near Belfry	525	84		628	470	83		563
ROCK CREEK near Red Lodge	Streamflow measurements			115	discontinued by USGS			88.1
INFLOW COONEY RESERVOIR near Boyd (2)	48.0	79		60.5	39.5	80		49.5
YELLOWSTONE RIVER at Billings	4040	90	3133	4,516	3450	90	3793	3,833
BIGHORN RIVER near St. Xavier (3)	1572	80	2060	1,976	1435	80	1849	1,794
LITTLE BIGHORN RIVER near Hardin	173	95		182	152	94		162
TONGUE RIVER near Decker	248	90		275	227	90		252
YELLOWSTONE RIVER at Miles City (4)	5838	86		6,787	5025	85		5,906
POWDER RIVER at Moorhead	236	90		263	219	90		243
YELLOWSTONE RIVER near Sidney (5)	6400	85		7,518	5500	84		6,544

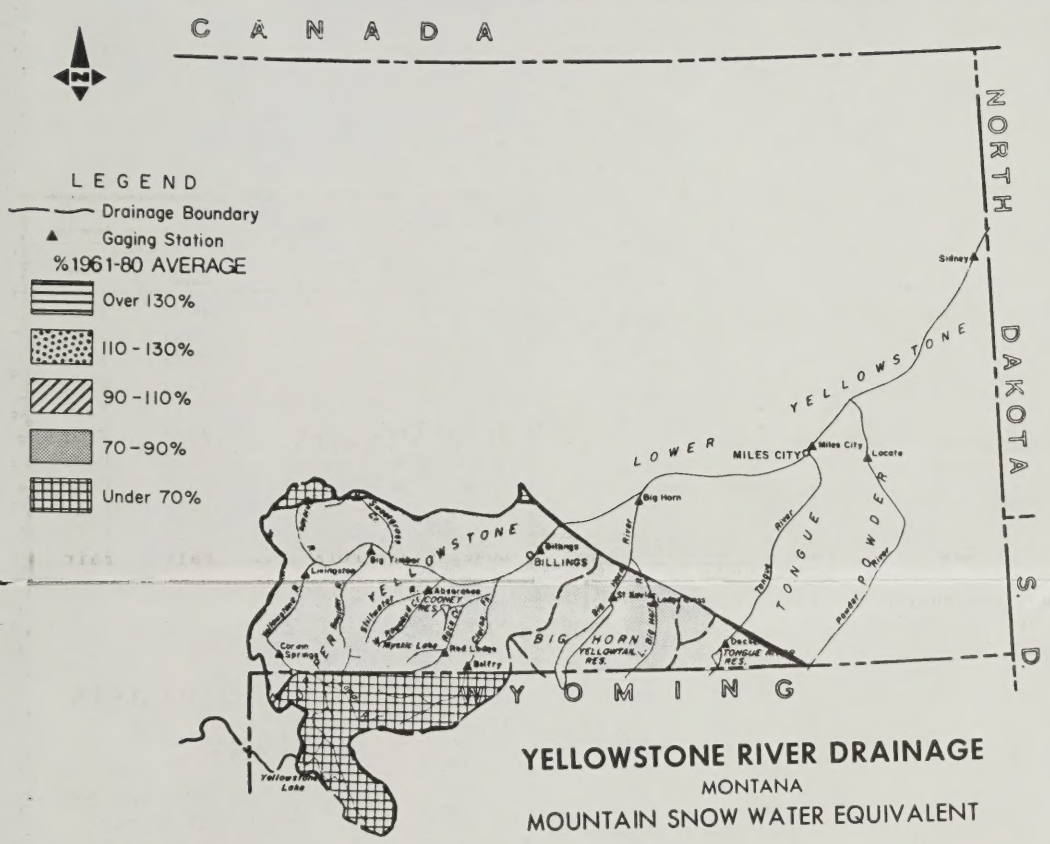
(1) Adjusted for storage in Mystic Lake.
(2) Adjusted for storage in Cooney Reservoir.
(3) Adjusted for storage in Buffalo Bill, Boysen, Bull Lake, Pilot Butte and Bighorn Reservoirs.
(4) Adjusted for storage in Bull Lake, Buffalo Bill, Boysen, Pilot Butte, Bighorn and Tongue River Reservoirs.
(5) Adjusted for reservoirs shown in (4) and diversions into the Lower Yellowstone Canal.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

WATER SUPPLY OUTLOOK

Expressed as "Poor, Fair, Average, Excellent" With Respect to Usual Supply.

STREAM or AREA	Flow Period: Spring Season	Flow Period: Late Season
Yellowstone at Livingston	Fair	Fair
Shields	Fair	Poor
Boulder	Fair	Fair
Sweetgrass - Big Timber	Fair	Poor
Stillwater	Fair	Fair
Rock Creek	Fair	Fair
Clark's Fork	Fair	Fair
Yellowstone above Bighorn	Fair	Fair
Bighorn	Fair	Fair
Little Bighorn	Fair	Fair
Tongue	Good	Fair
Powder	Good	Fair
Lower Yellowstone	Fair	Fair



YELLOWSTONE RIVER DRAINAGE
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT

Hoping for improved weather patterns

Spring and summer streamflow is expected to be 15 to 20 percent less than average for most streams flowing into the Yellowstone River. The snowfall over the next 2 to 3 months is going to be very critical in determining whether or not shortages of irrigation water will develop this year.

SUMMARY of SNOW MEASUREMENTS

(COMPARISON WITH PREVIOUS YEARS)

RIVER BASIN and/or SUB-WATERSHED	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF: Last Year	Average
Upper Yellowstone ab Livingston	13	94	72
Shields	5	114	77
Boulder & Stillwater	3	105	78
Rock Creek & Clark's Fork	10	86	76
Yellowstone (ab Bighorn River)	31	95	75
Bighorn/Wyoming	29	105	88
Little Bighorn	2	91	89
Bighorn (Total)	31	104	88
Tongue	10	92	88
Powder	7	93	93
Yellowstone (Total)	79	98	82

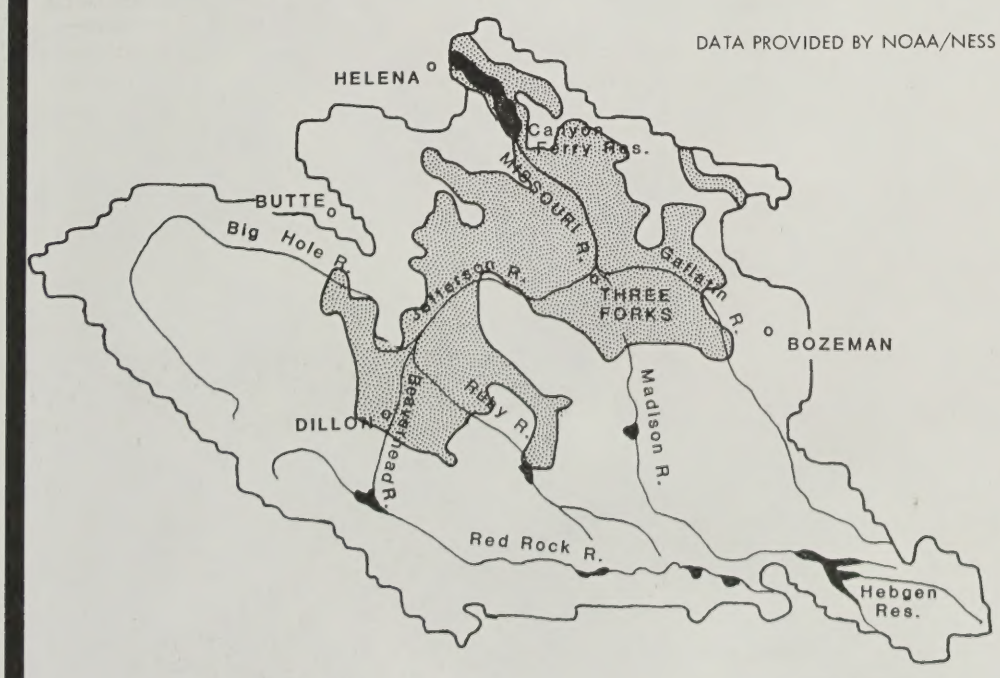
Snowpack about 70 percent of average

Mountain snowfall was below average in all parts of the Yellowstone River drainage during January. The total amount of water accumulated in the snowpack is presently around 75 percent of average.

Soils under the snowpack generally have near to a little above average moisture levels.

SATELLITE SNOW COVER

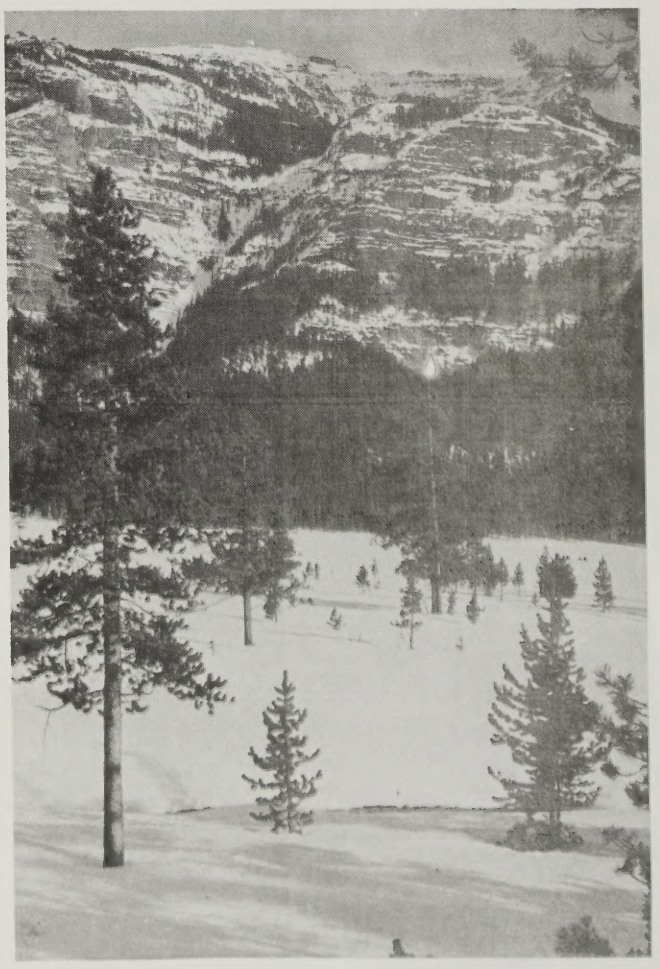
DATA PROVIDED BY NOAA/NESS



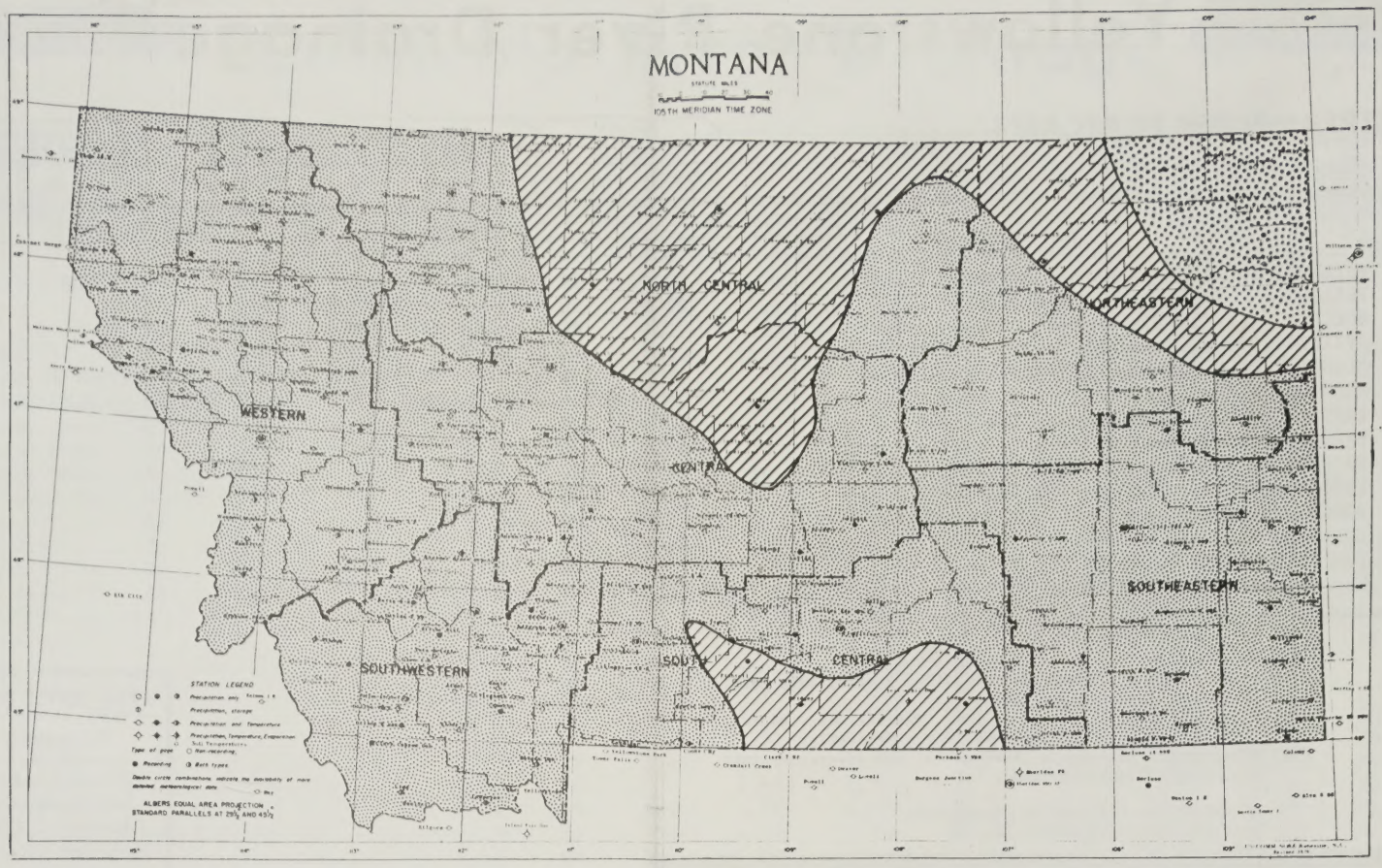
Snow Covered Area Scale 1:2,500,000

MISSOURI RIVER BASIN
Above
Canyon Ferry Dam

DATE	PERCENT SNOW COVER	AVERAGE SNOWLINE ELEVATION IN FEET
November 29, 1983	99.1	3940
December 20, 1983	100	3800
January 9, 1984	72	5720
January 31, 1984	78	5440



Most areas continue to show below average snow cover. Southfacing slopes are beginning to bare off.



Over 120%

80 - 120%

Under 80%

VALLEY PRECIPITATION

JANUARY 1984

Source: NWS
Great Falls, MT

New averages

New (1961-1980) snow course water content averages have been mailed. If you did not receive a copy or if you need a copy, please send your request to:

USDA-SCS-Snow Surveys
Federal Building-Room 443
10 East Babcock
Bozeman, MT 59715

(Or telephone: 406-587-5271 Ext. 4270 (FTS 585-4270))

AGENCIES AND ORGANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

GOVERNMENT AGENCIES

Canada
- Department of the Environment
  - Atmospheric Environment Service
  - Water Management Service
- British Columbia Ministry of Environment
  - Inventory and Engineering Branch, Hydrology Section
- Alberta Environment
  - Technical Services Division

Federal
- Department of the Army - Corps of Engineers
- Department of Agriculture - Forest Service
- Soil Conservation Service
- Department of Commerce - National Environmental Satellite Service
- National Weather Service
- Department of Interior - Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation
- Department of Energy - Bonneville Power Administration

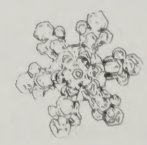
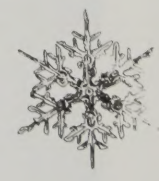
STATE AGENCIES
- Montana Conservation Districts
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State University - Agricultural Experiment Station
- University of Montana - School of Forestry

PRIVATE ORGANIZATIONS
- The Anaconda Company
- Big Sky of Montana
- Butte Water Company
- Flathead Valley Community College
- Montana Power Company
- Pondera County Canal & Reservoir Company

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH

Basin or Stream	RESERVOIR	Usable Capacity	Usable Storage		
			This Year	Last Year	Average
	COLUMBIA				
Kootenai	Koocanusa	5,748.2	3,619.0	2,732.0	---
Flathead	Hungry Horse	3,451.0	2,610.0	3,062.0	2,353.0
	Flathead Lake	1,791.0	875.0	973.8	1,179.0
	Camas (4)	45.2	29.0	29.9	11.1
	Mission Valley (8)	100.3	55.9	43.2	36.0
Clark Fork	Georgetown Lake	31.0	27.5	28.1	26.9
	Lower Willow Creek	4.9	3.3	1.4	1.4
	Nevada Creek	12.6	6.9	---	4.4
	Noxon Rapids	334.6	318.9	321.1	312.2
Bitterroot	Painted Rocks	31.7	8.7	---	16.5
	Como	34.9	10.8	---	10.5
	MISSOURI				
Beaverhead	Lima	84.0	51.4	49.9	34.4
	Clark Canyon	257.2	177.1	169.0	138.7
Ruby	Ruby	38.8	27.0	25.7	23.3
Madison	Hebgen Lake	377.5	262.1	274.2	232.6
	Ennis Lake	41.0	30.3	32.1	35.6
Gallatin	Middle Creek	8.0	3.9	3.7	3.3
Missouri	Canyon Ferry	2,043.0	1,723.0	1,762.0	1,613.0
	Hauser & Helena	61.9	63.0	63.0	60.4
	Helena Valley	10.4	4.3	5.7	5.6
	Lake Helena	10.4	10.9	10.9	10.0
	Holter Lake	81.9	81.0	81.0	69.4
	Fort Peck Lake	18,910.0	16,050.0	16,110.0	15,050.0
Smith	Smith River	10.6	9.2	8.0	6.5
	Newlan Creek	12.4	8.8	8.7	9.2
Musselshell	Bair	7.0	2.9	6.1	9.5
	Martinsdale	23.1	13.9	16.3	10.7
	Deadman's Basin	72.2	56.5	---	41.0
Sun	Gibson	99.1	50.6	58.6	40.8
	Willow Creek	32.2	24.0	23.9	20.4
	Pishkun	32.0	19.6	20.1	17.1
Marias	Lower Two Medicine	11.9	---	---	6.8
	Four Horns	19.2	---	---	12.5
	Swift	30.0	11.9	13.5	14.1
	Lake Frances	111.9	47.2	85.5	70.0
Milk	Elwell (Tiber)	1,347.0	692.3	691.0	545.6
	Beaver Creek	3.5	3.1	3.0	1.7
	Fresno	127.2	24.6	13.3	58.0
	Nelson	66.8	20.4	46.7	40.0
	HUDSON BAY				
St. Mary's	Lake Sherburne	64.3	37.3	34.2	19.5
	YELLOWSTONE				
Stillwater	Mystic Lake	21.0	7.5	6.3	10.3
Clark's Fork	Cooney	27.4	16.6	16.0	14.0
Tongue	Tongue River	68.0	14.7	26.4	30.2
Bighorn	Bighorn Lake	1,356.0	879.6	965.5	609.2

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